

1060-Exam 1 Review

1. 245° $245^\circ - 360^\circ = \boxed{-115^\circ}$ $245^\circ + 360^\circ = \boxed{605^\circ}$

2. $\frac{2\pi}{5}$ $\frac{2\pi}{5} - 2\pi = \frac{2\pi}{5} - \frac{10\pi}{5} = \boxed{-\frac{8\pi}{5}}$ $\frac{2\pi}{5} + 2\pi = \frac{2\pi}{5} + \frac{10\pi}{5} = \boxed{\frac{12\pi}{5}}$

3. -179° $-179^\circ - 360^\circ = \boxed{-539^\circ}$ $-179^\circ + 360^\circ = \boxed{181^\circ}$

4. $-\frac{\pi}{12}$ $-\frac{\pi}{12} - 2\pi = -\frac{\pi}{12} - \frac{24\pi}{12} = \boxed{-\frac{25\pi}{12}}$ $-\frac{\pi}{12} + 2\pi = -\frac{\pi}{12} + \frac{24\pi}{12} = \boxed{\frac{23\pi}{12}}$

5. -932°
 $-932^\circ + 360^\circ = -572^\circ$
 $-572^\circ + 360^\circ = -212^\circ$
 $-212^\circ + 360^\circ = \boxed{148^\circ}$

6. $\frac{8\pi}{3}$ $\frac{8\pi}{3} - 2\pi = \frac{8\pi}{3} - \frac{6\pi}{3} = \boxed{\frac{2\pi}{3}}$

7. 1375°
 $1375^\circ - 360^\circ = 1015^\circ$
 $1015^\circ - 360^\circ = 655^\circ$
 $655^\circ - 360^\circ = \boxed{295^\circ}$

18. $-\frac{37\pi}{8}$
 $-\frac{37\pi}{8} + 2\pi = -\frac{37\pi}{8} + \frac{16\pi}{8} = -\frac{21\pi}{8}$
 $-\frac{21\pi}{8} + 2\pi = -\frac{21\pi}{8} + \frac{16\pi}{8} = -\frac{5\pi}{8}$
 $-\frac{5\pi}{8} + 2\pi = -\frac{5\pi}{8} + \frac{16\pi}{8} = \boxed{\frac{11\pi}{8}}$

19. 210° $\frac{210^\circ}{1} \frac{\pi \text{ rad}}{180^\circ} = \boxed{\frac{7\pi}{6}}$

10. 72° $\frac{72^\circ}{1} \frac{\pi \text{ rad}}{180^\circ} = \frac{72\pi}{180} = \boxed{\frac{2\pi}{5}}$

11. -135° $\frac{-135^\circ}{1} \frac{\pi \text{ rad}}{180^\circ} = \boxed{-\frac{3\pi}{4}}$

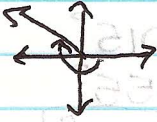
$$12. -15^\circ \quad \frac{-15^\circ}{1} \frac{\pi \text{ rad}}{180^\circ} = \frac{-15\pi}{180} = \boxed{-\frac{\pi}{12}}$$

$$13. -\frac{2\pi}{3} \quad \frac{-\frac{2\pi \text{ rad}}{3} \cdot \frac{180^\circ}{\pi \text{ rad}}}{1} = \boxed{-120^\circ}$$

$$14. \frac{4\pi}{9} \quad \frac{\frac{4\pi \text{ rad}}{9} \cdot \frac{180^\circ}{\pi \text{ rad}}}{1} = \boxed{80^\circ}$$

$$15. \frac{11\pi}{6} \quad \frac{\frac{11\pi \text{ rad}}{6} \cdot \frac{180^\circ}{\pi \text{ rad}}}{1} = \boxed{330^\circ}$$


$$16. -\frac{7\pi}{5} \quad \frac{-\frac{7\pi \text{ rad}}{5} \cdot \frac{180^\circ}{\pi \text{ rad}}}{1} = \boxed{252^\circ}$$

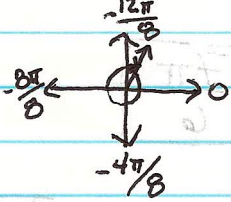
$$17. -200^\circ \quad \text{Quadrant II}$$


$$18. 1568^\circ \quad \begin{aligned} 1568^\circ - 360^\circ &= 1208^\circ & 1208^\circ - 360^\circ &= 848^\circ \\ 848^\circ - 360^\circ &= 488^\circ & 488^\circ - 360^\circ &= 128^\circ \end{aligned}$$

4 circles + 128°

Quadrant II




$$19. -\frac{13\pi}{8} \quad \text{Quadrant I}$$


$$20. \frac{19\pi}{4} \quad \begin{aligned} \frac{19\pi}{4} - 2\pi &= \frac{19\pi}{4} - \frac{8\pi}{4} = \frac{11\pi}{4} \\ \frac{11\pi}{4} - 2\pi &= \frac{11\pi}{4} - \frac{8\pi}{4} = \frac{3\pi}{4} \end{aligned}$$

2 circles + 3pi/4

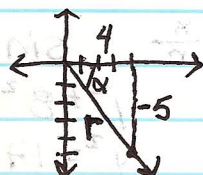
Quadrant II



21. $(4, -5); \cos \alpha$

$$\cos \alpha = \frac{x}{r}$$

$$\boxed{\cos \alpha = \frac{4}{\sqrt{41}}}$$



$$r^2 = 4^2 + 5^2$$

$$r^2 = 16 + 25$$

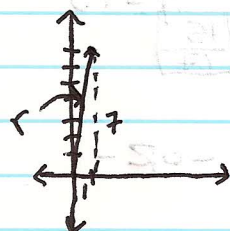
$$r^2 = 41$$

$$r = \sqrt{41}$$

22. $(1, 7); \sin \alpha$

$$\sin \alpha = \frac{y}{r}$$

$$\boxed{\sin \alpha = \frac{7}{5\sqrt{2}}}$$



$$r^2 = 1^2 + 7^2$$

$$r^2 = 1 + 49$$

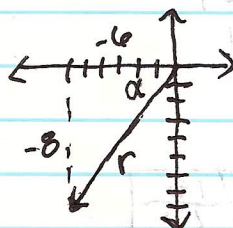
$$r^2 = 50$$

$$r = \sqrt{50} = 5\sqrt{2}$$

23. $(-6, -8); \sec \alpha$

$$\sec \alpha = \frac{r}{x}$$

$$\sec \alpha = \frac{10}{-6} = -\frac{5}{3}$$



$$r^2 = 6^2 + 8^2$$

$$r^2 = 36 + 64$$

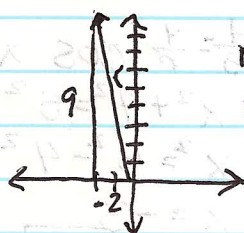
$$r^2 = 100$$

$$r = 10$$

24. $(-2, 9); \csc \alpha$

$$\csc \alpha = \frac{r}{y}$$

$$\boxed{\csc \alpha = \frac{\sqrt{85}}{9}}$$



$$r^2 = 9^2 + 2^2$$

$$r^2 = 81 + 4$$

$$r^2 = 85$$

$$r = \sqrt{85}$$

25. $\sin\left(\frac{2\pi}{3}\right) = \boxed{\frac{\sqrt{3}}{2}}$

26. $\tan\left(\frac{5\pi}{6}\right) = \frac{1}{2} \div \frac{\sqrt{3}}{2} = \frac{1}{2} \cdot \frac{2}{\sqrt{3}} = \boxed{\frac{1}{\sqrt{3}} \text{ or } \frac{\sqrt{3}}{3}}$

27. $\cos(225^\circ) = \boxed{-\frac{\sqrt{2}}{2}}$

28. $\sec 270^\circ = \frac{1}{\cos 270^\circ} = \frac{1}{0} \boxed{\text{undefined}}$

29. $\csc\left(\frac{3\pi}{4}\right) = \frac{1}{\sin(\frac{3\pi}{4})} = \frac{1}{1/\sqrt{2}} = \boxed{\sqrt{2}}$

30. $\cot 330^\circ = \frac{x}{y} = \frac{\sqrt{3}}{2} \div -\frac{1}{2} = \frac{\sqrt{3}}{2} \cdot -2 = \boxed{-\sqrt{3}}$

31. $\sin(-60^\circ) = \boxed{-\frac{\sqrt{3}}{2}}$

32. $\cos\left(-\frac{5\pi}{3}\right) = \boxed{\frac{1}{2}}$

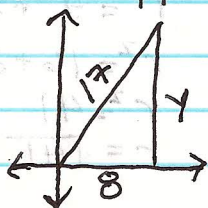
33. $\tan(-45^\circ) = \frac{-\sqrt{2}/2}{\sqrt{2}/2} = \boxed{-1}$

34. $\sec\left(-\frac{7\pi}{6}\right) = \frac{1}{\cos(-7\pi/6)} = \boxed{-\frac{2}{\sqrt{3}}}$

35. $\csc(-270^\circ) = \frac{1}{\sin(-270^\circ)} = \frac{1}{-1} = \boxed{-1}$

36. $\cot(-\pi) = \frac{x}{y} = \frac{-1}{0} \boxed{\text{undefined}}$

37. $\cos \alpha = \frac{8}{17} = \frac{x}{r}$ $\sin \alpha > 0$ (y is positive)



$$y^2 + 8^2 = 17^2$$

$$y^2 = 17^2 - 8^2 = 289 - 64$$

$$y^2 = 225$$

$$y = 15$$

$$\sin \alpha = \frac{y}{r} = \frac{15}{17}$$

-OR-

$$\sin^2 \alpha + \cos^2 \alpha = 1$$

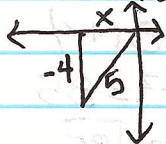
$$\sin^2 \alpha + \left(\frac{8}{17}\right)^2 = 1$$

$$\sin^2 \alpha + \frac{64}{289} = 1$$

$$\sin^2 \alpha = \frac{225}{289}$$

$$\sin \alpha = \sqrt{\frac{225}{289}} = \frac{15}{17}$$

38. $\sin \alpha = \frac{-4}{5} = \frac{y}{r}$ $\cos \alpha < 0$ (x is negative)



$$x^2 + 4^2 = 5^2$$

$$x^2 = 5^2 - 4^2 = 25 - 16 = 9$$

$$x = -3$$

$$\cos \alpha = \frac{x}{r} = \frac{-3}{5}$$

-OR-

$$\sin^2 \alpha + \cos^2 \alpha = 1$$

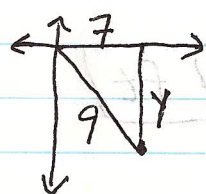
$$\left(\frac{-4}{5}\right)^2 + \cos^2 \alpha = 1$$

$$\frac{16}{25} + \cos^2 \alpha = 1$$

$$\cos^2 \alpha = \frac{9}{25}$$

$$\cos \alpha = -\sqrt{\frac{9}{25}} = \frac{-3}{5}$$

39. $\cos \alpha = \frac{7}{9} = \frac{x}{r}$ α in QIV



$$y^2 + 7^2 = 9^2$$

$$y^2 = 9^2 - 7^2 = 81 - 49$$

$$y^2 = 32$$

$$y = -\sqrt{32} = -4\sqrt{2}$$

$$\csc \alpha = \frac{r}{y} = \frac{9}{-4\sqrt{2}}$$

-OR-

$$\sin^2 \alpha + \cos^2 \alpha = 1$$

$$\sin^2 \alpha + \left(\frac{7}{9}\right)^2 = 1$$

$$\sin^2 \alpha + \frac{49}{81} = 1$$

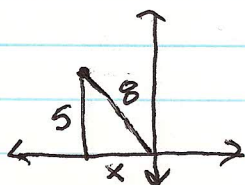
$$\sin^2 \alpha = \frac{32}{81}$$

$$\sin \alpha = -\sqrt{\frac{32}{81}} = \frac{-4\sqrt{2}}{9}$$

$$\csc \alpha = \frac{1}{\sin \alpha}$$

$$\csc \alpha = -\frac{9}{4\sqrt{2}}$$

40. $\sin \alpha = \frac{5}{8} = \frac{y}{r}$ α in QII



$$x^2 + 5^2 = 8^2$$

$$x^2 = 8^2 - 5^2 = 64 - 25 = 39$$

$$x = -\sqrt{39}$$

$$\sec \alpha = \frac{r}{x} = \frac{-8}{\sqrt{39}}$$

-OR-

$$\sin^2 \alpha + \cos^2 \alpha = 1$$

$$\left(\frac{5}{8}\right)^2 + \cos^2 \alpha = 1$$

$$\frac{25}{64} + \cos^2 \alpha = 1$$

$$\cos^2 \alpha = \frac{39}{64}$$

$$\cos \alpha = -\sqrt{\frac{39}{64}} = -\frac{\sqrt{39}}{8}$$

$$\sec \alpha = \frac{1}{\cos \alpha}$$

$$\sec \alpha = -\frac{8}{\sqrt{39}}$$

41. $\alpha = \pi/4$ $r = 12$ ft

$$S = \alpha r$$

$$S = (\pi/4)(12) = \boxed{3\pi \text{ ft or } 9.4 \text{ ft}}$$

42. $\alpha = 60^\circ$ $r = 2$ m

$$S = \alpha r$$

Remember: α must be in radians

$$60^\circ = \pi/3 \quad S = (\pi/3)(2) = \boxed{\frac{2\pi}{3} \text{ m or } 2.1 \text{ m}}$$

43. $\alpha = 1.3$ rad $r = 26.1$ in

$$S = \alpha r$$

$$S = (1.3)(26.1) = \boxed{33.93 \text{ in}}$$

44. $\alpha = 2.7$ rad $S = 13$ cm

$$S = \alpha r$$

$$13 = 2.7 r$$

$$\boxed{r = 4.8 \text{ cm}}$$

45. $\alpha = 57^\circ$ $S = 17$ m

$$\frac{57^\circ}{1} \cdot \frac{\pi \text{ rad}}{180^\circ} = 0.995 \text{ rad}$$

$$S = \alpha r$$

$$17 = 0.995 r$$

$$\boxed{r = 17.1 \text{ m}}$$

46. $\alpha = \pi/4$ $S = 10$ ft

$$S = \alpha r$$

$$10 = (\pi/4) r$$

$$\boxed{r = 12.7 \text{ ft}}$$

47. $r = 6$ yds $\alpha = 30^\circ$ 30° is $1/12$ of a circle ($\frac{30^\circ}{360^\circ}$)

$$\text{Area of circle} = \pi r^2 = \pi (6)^2 = 36\pi \text{ yds}^2$$

$$\text{Area of sector} = (\frac{1}{12})(36\pi) = \boxed{3\pi \text{ yds}^2 \text{ or } 9.4 \text{ yds}^2}$$

48. $r = 16 \text{ ft}$ $\alpha = 2\pi/3$
 $2\pi/3$ is 120° ($1/3$ of the circle)

Area of circle $= \pi r^2 = \pi (16)^2 = 256\pi \text{ ft}^2$

Area of sector $= (1/3)(256\pi) = \boxed{268.1 \text{ ft}^2}$

49. $r = 8 \text{ in}$, $\alpha = \pi/4$
 $\pi/4$ is 45° ($1/8$ of the circle)

Area of circle $= \pi r^2 = \pi (8)^2 = 64\pi \text{ in}^2$

Area of sector $= (1/8)(64\pi) = \boxed{8\pi \text{ in}^2 \text{ or } 25.1 \text{ in}^2}$

50. $d = 20 \text{ in}$ 45 rev/min Want: in/min
 $C = 20\pi \text{ in}$

$\frac{45 \text{ rev}}{\text{min}} \frac{20\pi \text{ in}}{\text{rev}} = \boxed{2827 \text{ in/min}}$

51. 2300 rpm Want: rad/min

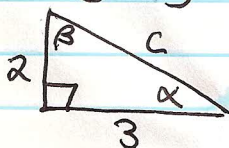
$\frac{2300 \text{ rev}}{\text{min}} \frac{2\pi \text{ rad}}{\text{rev}} = \boxed{14,451.3 \text{ rad/min}}$

52. $d = 12 \text{ in}$ $33\frac{1}{3} \text{ rpm}$ Want: rad/sec & in/min

$\frac{33\frac{1}{3} \text{ rev}}{\text{min}} \frac{2\pi \text{ rad}}{\text{rev}} \frac{\text{min}}{60 \text{ sec}} = \boxed{3.5 \text{ rad/sec}}$

$\frac{33\frac{1}{3} \text{ rev}}{\text{min}} \frac{12\pi \text{ in}}{\text{rev}} = \boxed{1256.6 \text{ in/min}}$

53. $a = 2$ $b = 3$



$2^2 + 3^2 = c^2$

$13 = c^2$

$\boxed{c = 3.6}$

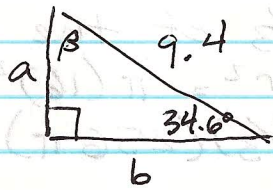
$\tan \alpha = 2/3$

$\alpha = \tan^{-1}(2/3)$

$\boxed{\alpha = 33.7^\circ}$

$\beta = 90^\circ - 33.7^\circ = \boxed{56.3^\circ}$

54. $\alpha = 34.6^\circ$ $c = 9.4$



$$\beta = 90^\circ - 34.6^\circ = \boxed{55.4^\circ}$$

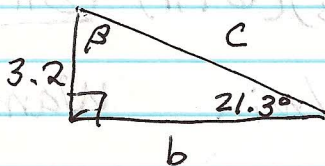
$$\sin 34.6^\circ = a/9.4$$

$$\boxed{a = 5.3}$$

$$\cos 34.6^\circ = b/9.4$$

$$\boxed{b = 7.7}$$

55. $a = 3.2$ $\alpha = 21.3^\circ$



$$\beta = 90^\circ - 21.3^\circ = \boxed{68.7^\circ}$$

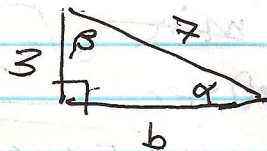
$$\tan 21.3^\circ = \frac{3.2}{b}$$

$$b = \frac{3.2}{\tan 21.3^\circ} = \boxed{8.2}$$

$$\sin 21.3^\circ = \frac{3.2}{c}$$

$$c = \frac{3.2}{\sin 21.3^\circ} = \boxed{8.8}$$

56. $a = 3$ $c = 7$



$$b^2 + 3^2 = 7^2$$

$$b^2 = 7^2 - 3^2$$

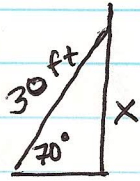
$$b = \sqrt{7^2 - 3^2} = \boxed{6.3}$$

$$\sin \alpha = \frac{3}{7}$$

$$\alpha = \sin^{-1} \frac{3}{7} = \boxed{25.4^\circ}$$

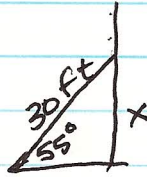
$$\beta = 90^\circ - 25.4^\circ = \boxed{64.6^\circ}$$

57.



$$\sin 70^\circ = \frac{x}{30}$$

$$x = 28.1 \text{ ft}$$

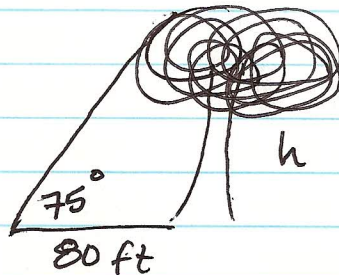


$$\sin 55^\circ = \frac{x}{30}$$

$$x = 24.6 \text{ ft}$$

min height: 24.6 ft
max height: 28.1 ft

58.

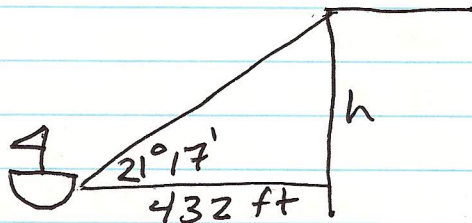


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$$\tan 75^\circ = \frac{h}{80}$$

$$h = 298.6 \text{ ft}$$

59.



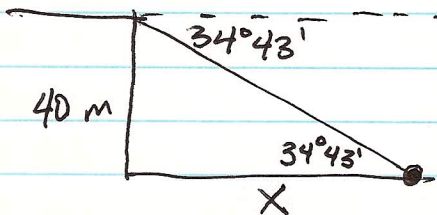
$$\tan 21^\circ 17' = \frac{h}{432}$$

$$\tan 21.283^\circ = \frac{h}{432}$$

$$17' = \left(\frac{17}{60}\right)^\circ = .283^\circ$$

$$h = 168 \text{ ft}$$

60.



$$\tan 34^\circ 43' = 40/x$$

$$x = 40$$

$$\tan 34.717^\circ$$

$$x = 40$$

$$\tan 34.717^\circ$$

$$x = 57.7 \text{ m}$$

$$43' = \left(\frac{43}{60}\right)^\circ = .717^\circ$$